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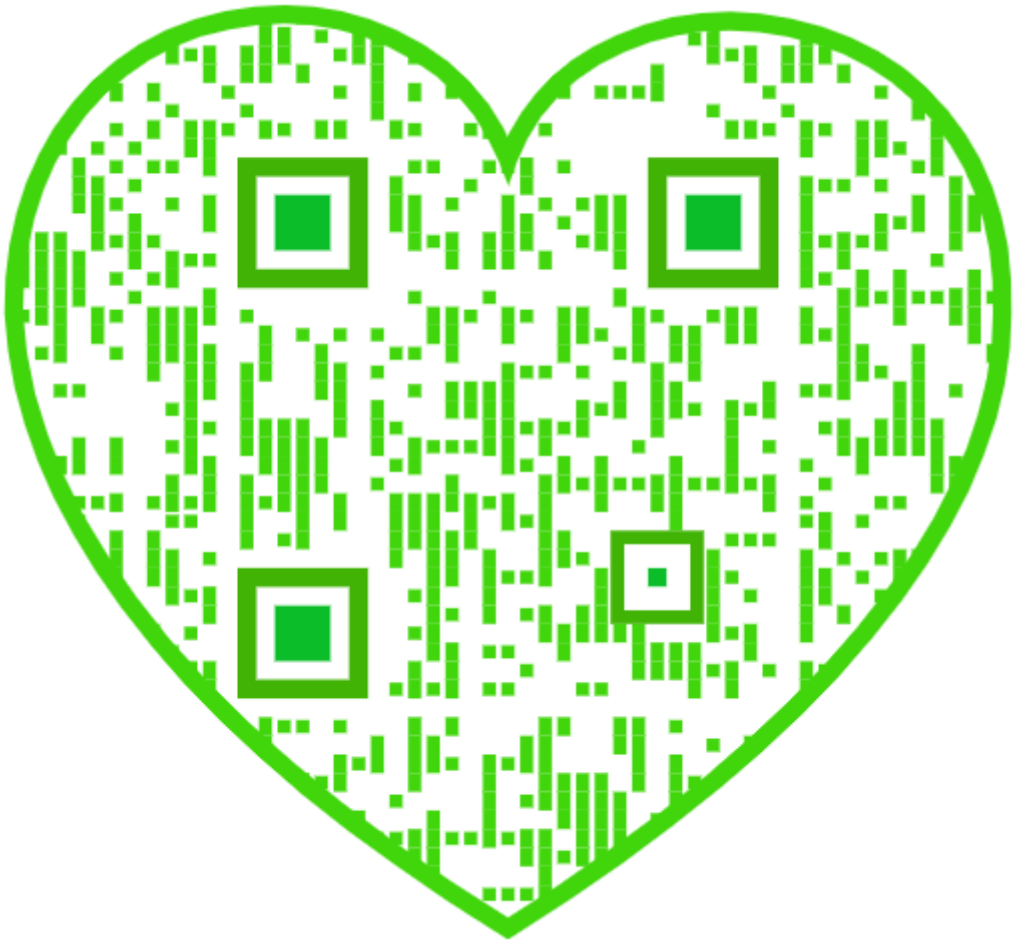
O FIGURE OUT AND ARRANGE
ATTERN WORK
FOR WEAVING COLORED FABRICS

KING



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HOW TO FIGURE OUT AND ARRANGE
PATTERN WORK
FOR WEAVING COLORED FABRICS

EXPLAINED
AND
ILLUSTRATED

TOGETHER WITH
OTHER SIMPLE RULES AND
CALCULATIONS PERTAINING
TO WEAVING DEPARTMENTS

BY J. G. KING, SUPERINTENDENT
ELMIRA COTTON MILLS COMPANY
BURLINGTON, NORTH CAROL NA

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PREFACE

Being a practical mill man, and having come in contact with more or less superintendents, boss weavers and boss beamers that are *not* familiar with the methods of figuring out and arranging pattern work to best advantage—which it is quite important to know in order to handle a colored goods mill successfully—the idea was suggested to me, by one that wanted to learn, that I get up a plain and simple book on the subject, together with a few other simple rules and calculations that have proven quite useful to everyone connected with weaving departments; and being aware of the fact that this part of the work was so little understood by so many that *ought to know*, and also in view of the fact that there are scores of second hands, loom fixers, beamer hands, etc., who are in line for promotion who would like to have the information as contained in this book, I have made special effort to get the book up in the plainest and simplest manner possible, avoiding all signs and abbreviations, etc.; or, in other words, I have put the feed way down on the lowest shelf, so that anyone with only a slight knowledge of arithmetic can understand and master it as well as those that happen to be better informed.

I have no knowledge of any such book ever being published on this subject, as herein illustrated and explained, and it is the writer's opinion that it will eventually be appreciated as it becomes known, especially so among those who have never had the apportunity of much schooling or any special textile training.

Respectfully,

J. G. KING.

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J. G. KING

INTRODUCTORY

While this book is designed to teach anyone how to work out patterns and arrange them to best advantage in all classes of colored work, checks, dress patterns, stripes, etc., in order to make the illustrations plain, each pattern is illustrated in a stripe; it being understood by all that are likely to be interested that the pattern in the filling of a piece of goods has nothing to do with the figuring out and arranging of the warp ends.

The patterns as shown here are not designed with the view of showing any specially attractive effects, but they were selected because each pattern works out differently; and you will find that practically every question that is likely to come up in working out and arranging a pattern, is brought out and explained in some of the designs as shown in this book.

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To find out how much the cloth will Take-up in *Width* in Weaving.

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How to figure the Weight of a piece of goods *before* it is woven, plain weave.

How to figure the Weight of a piece of goods with *cord work*.

How to figure the weight of goods *after* they are woven, by pounds, and by ounces.

CHAPTER THIRTEEN

How to find the *weight* of a warp.

How to find the *length*, and how to find *the number of the yarn*.

CHAPTER FOURTEEN

Short rules on figuring Percentage of Production.

How to find *Loom Constant*.

How to find *Cloth Constant*.

How to find *Average Speeds of Looms* running different speeds.

CHAPTER ONE

We will take for our first pattern to be worked out a very simple one, as follows:

8 black
8 white
—
16 Total ends in pattern

In this warp we will say we will have 1400 ends in addition to the selvage, and we will have 32 ends for selvage—16 ends on each side of the cloth; therefore, our total number of ends in the warp will be 1432.

Now in working out the pattern we will simply use the 1400 ends and add the other 32 ends, we propose to use for selvage later.

Our pattern should read as follows:

8 ends of black
8 ends of white
—
16

Now the above represents one *complete pattern* and we find we have 16 ends to each complete pattern, and in order to find out how much of each color is required in the warp, we must first find out how many *complete patterns* there will be in the full width of the cloth; therefore, as we are to have 1400 ends in the full width of the cloth besides the selvage, we must first divide 1400 by 16, which will give us the total number of complete patterns, thus:

16) 1400 (87 complete patterns
128
—
120
112
—
8 ends over

Now we find we have 87 complete patterns and 8 ends over.

By referring to our pattern we find we call for 8 ends of black to each pattern, and as we have 87 patterns we must multiply our 87 by 8 in order to find out how many ends of black are required in the warp, thus:

```
 87
  8
-----
696 ends of black required
```

For the white, we get that the same way:

```
 87
  8
-----
696 ends of white required
```

Now we take the 696 ends of black and the 696 ends of white and add them together, thus:

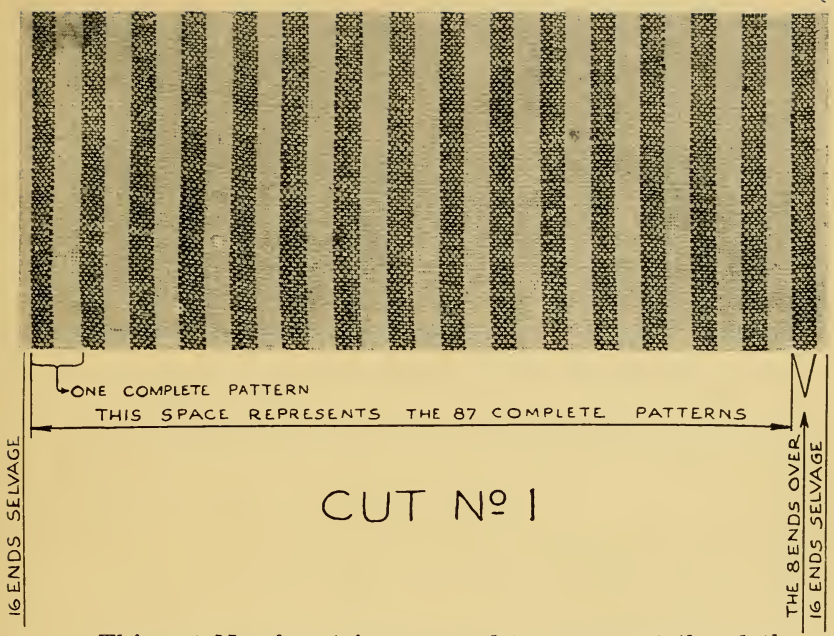
```
696 black
696 white
---------
1392
```

Here, we find the total ends of black and white only amount to 1392, and it should be 1400.

Now we refer back to where we worked out the pattern on page seven and we find we have *8 ends over*. This 8 ends added to the 1392 makes the 1400. Thus:

```
1392
   8
------
1400
```

Now the next question is, which color should these 8 ends be added on to? One might suppose that as the pattern calls for just as much white as it does black, that we should divide it and add 4 ends on each color; but that would not be right. By referring to cut below this will possibly be more clearly understood.



CUT Nº 1

This cut Number 1 is supposed to represent the cloth in the pattern we are working on, and you will notice that we have 8 of black next to the selvage on both sides; therefore, we have one more black stripe in the total width of the cloth than we have of the white, and as we have 8 ends of black to each stripe we will add the 8 ends we have over onto the black, making it read as follows:

704 ends of black
696 ends of white

1400
32 ends of white for selvage

1432

In this case it is important that we add the 8 ends on the black so as to make both sides of the cloth look alike, as shown in cut Number 1; and in order to make it clear to the beamer hand or slasher man, when he commences to lay in this warp, it should be written as follows:

End here	8 black	Total Ends
	8 white	704 black
	16	728 white, selvage included
		1432

87 patterns. Selvage 16 ends on both sides.

The point marked *"End here"* shows the beamer or slasher man just how the last pattern should come out when he lays in the warp, and if it does not come out as marked it proves that he has made a mistake in laying in, or that there is a mistake in the number of ends in the warp.

CHAPTER TWO

Now we will take up another pattern similar to the first one, as follows:

16 black
16 white
—
32 ends in pattern

In this pattern we will use 1400 ends besides the selvage, just as we did before. But, in order to find out how many complete patterns there will be, we must divide the 1400 ends by 32, as that is the number of ends to each complete pattern in this warp.

```
32)1400(43 complete patterns
   128
  ----
    120
     96
    ---
     24 ends over.
```

Now we have 16 ends of black to the pattern, and as we have 43 complete patterns we must multiply the 43 by 16 to find out the number of ends of black required:

```
  43
  16
 ---
 258
 43
 ---
 688 ends of black
```

And as we have 16 ends of white also to the pattern we find the required ends of white the same way:

```
  43
  16
 ---
 258
 43
 ---
 688 ends of white
```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Now we add together the 688 ends of black and the 688 ends of white, as follows:

688 black
688 white
1376

Here we find we have only 1376 ends, when we should have 1400. By referring back to where we worked out this pattern, we find we had *24 ends over*, and by adding the 24 ends to the 1376, thus:

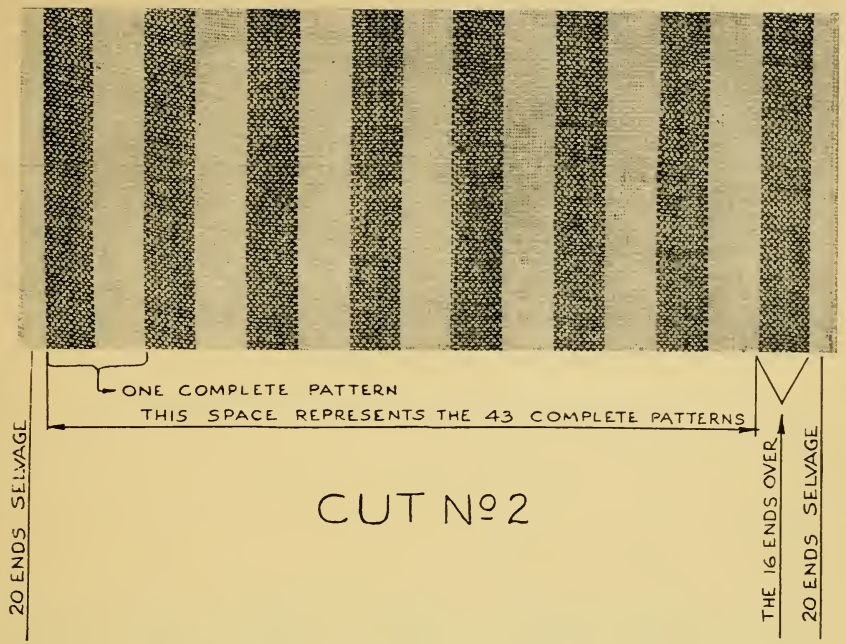
1376
24
1400

we find we have our correct number of ends.

Now the next question is, which color should we add the 24 ends onto? In this case, we would not want to add it all on the black as we did in the first pattern, but in order to make both sides of the cloth look alike we should add 16 ends on the black and 8 ends on the white. The 8 ends added on the white should be included in the selvage, making 20 of white on each side for this pattern, which would read as follows, and the cloth would show up on both sides like Cut Number 2:

End here	16 black	Total Ends
	16 white	704 black
	32	728 white, selvage included
		1432

43 patterns. 20 selvage on both sides.


ONE COMPLETE PATTERN
THIS SPACE REPRESENTS THE 43 COMPLETE PATTERNS
20 ENDS SELVAGE
THE 16 ENDS OVER
20 ENDS SELVAGE

CUT Nº 2

CHAPTER THREE

Suppose we take another pattern with 1400 ends, same as the first two we have just gone over, but have this one read as follows:

```
20 black
20 white
--
40 ends in pattern
```

We will work this one out just the same way as the first two, as follows:

```
40)1400(35 complete patterns
  120
  ---
   200
   200
   ---   and nothing over
```

We have 20 of black, also 20 of white, to each pattern, so we proceed to find the required number of ends of each color as before:

```
 35
 20
---
700 ends of black

 35
 20
---
700 ends of white

700 ends of black
700 ends of white
---
1400
```

In this case, our total number of ends comes out just right, but if we let our pattern go through, without any change, our cloth will show up like Cut Number 3, which you will admit, I am sure, will not show up to best advantage, as both sides are *not* alike.

CUT Nº 3

CUT Nº 4

This pattern, however, should be written as follows, and in that case it would show up on both sides alike, as shown in Cut Number 4:

Start with 10	20 black		Total Ends
End with 10 /	20 white	700	black
		732	white, selvage included
	40		
		1432	

35 patterns. 16 ends selvage on both sides.

The above marking means: Start the *first* pattern, when laying the warp in on the beamer or slasher, with 10 ends of black instead of 20, and the *last* pattern will come out with 10 ends of black on the other side, as shown in Cut Number 4.

CHAPTER FOUR

We will take the following pattern:

16 black
2 white
4 black
2 white

24 ends in one pattern

Here we have 24 ends to each pattern. Considering our warp to have 1400 ends, besides the selvage, as before, we of course follow the same rule in working out the pattern:

24)1400(58 complete patterns
120

200
192

8—— ends over

Now we have 20 ends of black to the pattern, so we multiply the 58 by 20 to find out how much black is required:

58
20

1160 ends of black required.

We have 4 ends of white to the pattern, so we multiply the 58 by 4 to see how much white is required:

58
4

232 ends of white required

Adding the 1160 ends of black to the 232 ends of white, we have

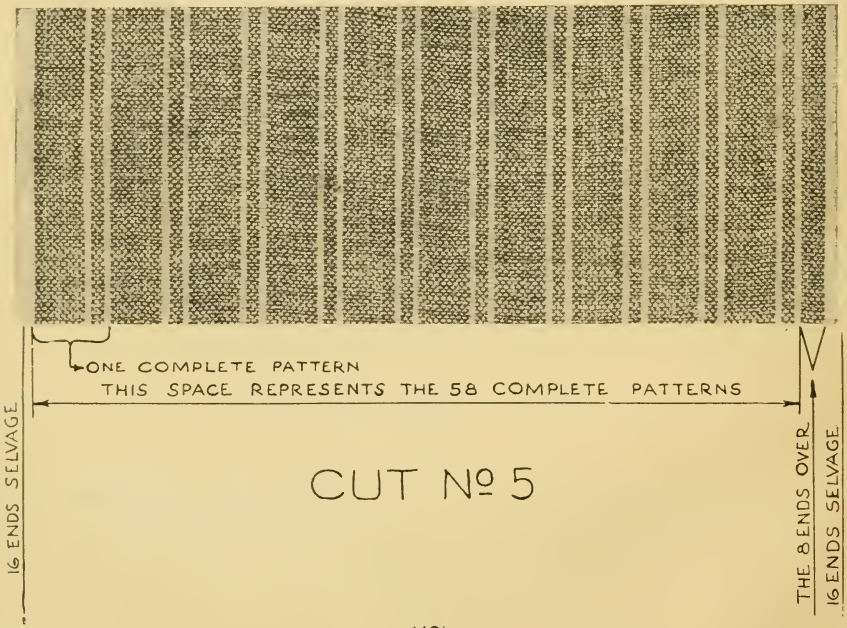
1160
232

1392

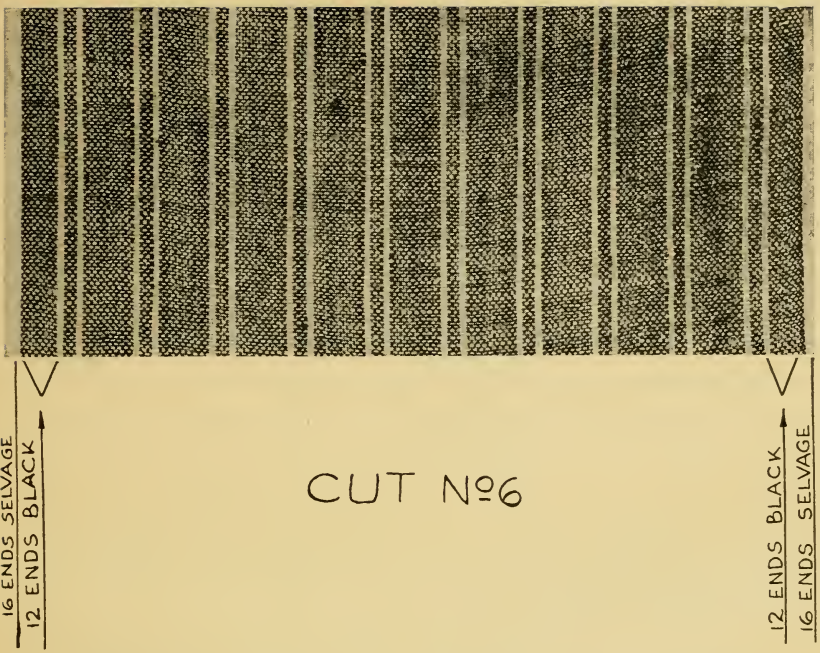
and by adding the 8 ends we have over, to the 1392, we find we have the correct number of ends—1400; or, in other words, it proves our example to be correct.

Now we must find out the right place to put these 8 ends we have over, and also know how it will show up in the cloth next to the selvage.

In reading over the pattern, we find we commence at the top and read 16 of black and at the bottom of the pattern is 2 of white, while of course every time you read the pattern over you start at the top 16 black and wind up at the 2 of white at the bottom. Well, now, we will just suppose that we have read the pattern over 58 times, which is the number of complete patterns we have in this warp. Now you will understand we have 58 patterns and 8 ends over, so when we start over the pattern the 59th time we are counting the 8 ends we have over, and when we get as much as 8 ends of black on the 59th pattern we have used up all our 1400 ends, so you see the 8 ends we have over will come on the black; therefore our warp, when laid in on the beamer or slasher, would show up 16 black next to selvage on one side and 8 of black next to selvage on other side, as shown in Cut Number 5.



CUT Nº 5



While the difference in appearance in this particular pattern on each side, is not very noticeable, and would make but little difference in the general appearance of the goods, yet it is just as easy to have both sides alike, which always looks better, so we will arrange the pattern accordingly and the cloth will show up on both sides as shown in Cut Number 6, and the pattern should be marked as follows:

Start with 12	16 black	Total Ends	
End with 12 /	2 white	1168	black
	4 black	264	white, selvage included
	2 white		
	24	1432	

58 complete patterns. 16 ends selvage on both sides.

CHAPTER FIVE

Now we will take a pattern having 4 colors, as follows:

This much towards the 37th pattern.	14 blue	
	2 white	
	2 red	
	2 white	
	2 red	
	2 white	36 complete patterns in the width of the cloth
	4 black	
	2 white	
Ends here	2 red	
	2 white	
	2 red	
	2 white	
	38	total ends in pattern.

In working out this pattern we will follow the same rule and methods as before, using 1400 ends in the warp in addition to the selvage:

```
38)1400(36 complete patterns
   114
  ----
   260
   228
  ----
    32 ends over
```

In working out a pattern with several colors, it is well to make a memorandum of the number of ends required of each color in one pattern, as it proves convenient in getting out the total number of ends of each color, and at the same time helps to avoid errors. So we will make our memorandum as follows, which is the number of ends required in one pattern of each color:

```
14 ends of blue
12 ends of white
 8 ends of red
 4 ends of black
---
38
```

This, you see, adds up 38, which shows that it balances with the 38 ends called for in the pattern (see page 20).

Referring back to our example on page 20 where we divided the 1400 by 38, we find we have 36 complete patterns, so to find the amount of each color required we proceed as before.

In our memorandum we find we have 14 ends of blue to the pattern, so we multiply the 36 by 14 to find the total number of ends of blue required, etc.:

```
  36
  14 blue
 ---
 144
  36
 ---
 504 total ends of blue

  36
  12 white
 ---
  72
 36
 ---
 432 total ends of white
```

```
 36                          36
  8 red                       4 black
 ---                         ---
 288 total ends of red       144 total ends of black
```

Now we add all our totals together, as follows:

```
 504 blue
 432 white
 288 red
 144 black
 ----
1368
```

Now we have only 1368 ends accounted for out of the 1400, which we are supposed to have. By adding the 32 ends we have over, as shown in our example, we find it totals up 1400, as follows:

```
1368
  32
 ----
1400
```

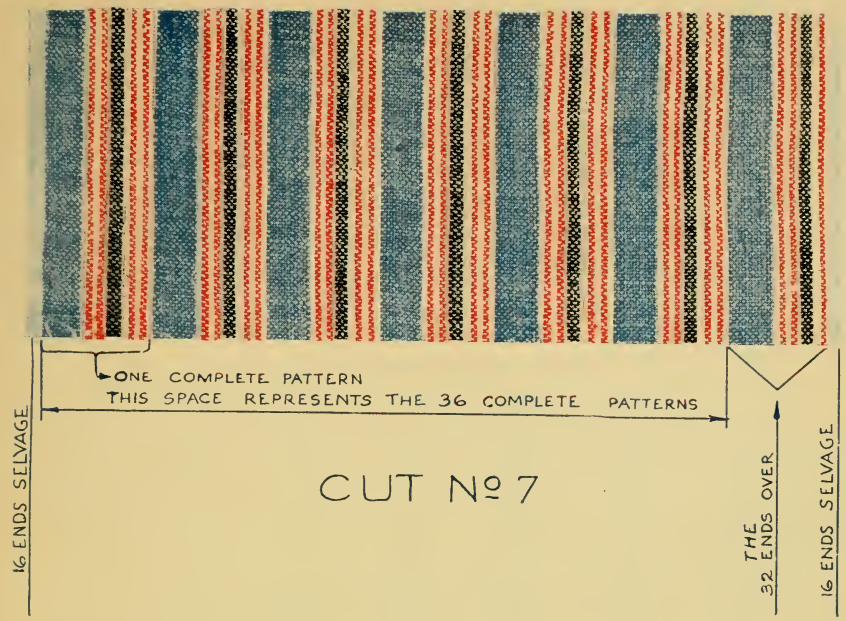
Here the question comes up again, what should we do with the 32 ends? Now get this fixed in your mind thoroughly, that the 36 complete patterns are all *included in the 1368 ends,* and the 32 ends we have over is simply that many more ends belonging to our warp and is that much on to the 37th pattern. So by referring back to our pattern on page 20, counting on down from the first of the pattern to the point indicated at 2 of red, you will see that it takes up the 32 ends which we have over, and by counting from this point back to the top, and making notes of the number of ends of each color, you will find out where to add the 32 ends, as follows: Starting at the 2 of red, as marked, we have—

6 ends of red
8 ends of white
4 ends of black
14 ends of blue
—
32

Now going back to page 21, where we got out our total number of ends of each color, we find, by adding the above to it, we have the following:

14 added to 504 gives us 518 ends of blue
8 added to 432 gives us 440 ends of white
6 added to 288 gives us 294 ends of red
4 added to 144 gives us 148 ends of black

With the pattern arranged, as we now have it on page 20, our cloth would show up on both sides like Cut Number 7 below.



CUT Nº 7

The above cut would pass, of course, but it would not be arranged to best advantage. Therefore it should be arranged as follows, and then both sides of the cloth would show up like Cut Number 8:

Start with 8	14 blue
End with 8	2 white
	2 red
	2 white
	2 red
	2 white
	4 black
	2 white
	2 red
	2 white
	2 red
	2 white
	38

Now by referring back to our pattern on page 20, you will find we only lack the last 6 ends of the pattern of

having enough to complete the last pattern (or, in other words, the 37th pattern), as we had 36 complete patterns and 32 ends over. But, in order to arrange this pattern to best advantage, we will take 8 of the 32 ends we propose to use for selvage, and use these 8 ends towards completing our last or 37th pattern.

By referring again to the pattern on page 20 you will note below the point indicated, that we require 4 ends of white and 2 ends of red to complete the 37th pattern. So here, we use 6 of the 8 ends we have taken off of the selvage, and we have 2 ends left over, which we will use on the blue, and our pattern will be as follows:

14 blue	
2 white	
2 red	
2 white	37 complete patterns
2 red	in the width of the
2 white	cloth and the 2 ends
4 black	of blue over as
2 white	shown at bottom.
2 red	
2 white	
2 red	
2 white	
2 blue over	

Now you must understand that the 14 ends of blue at the top of pattern would come first, and would be next to selvage on one side of the cloth, with the 2 ends of blue at the bottom of pattern coming last, when laying in the warp, and would be next to selvage on the other side. So we would have 14 of blue on one side of the cloth and 2 on the other. By adding the 14 ends and 2 ends together we have 16 ends, so we will use only 8 ends of blue in the first pattern, and we will have the other 8 to go on the other side, making the cloth look alike on both sides, as shown in Cut Number 8, and our pattern should be as follows:

Start with 8	14 blue	Total Ends
End with 8	2 white	520 blue
	2 red	468 white, selvage included
	2 white	296 red
	2 red	148 black
	2 white	
	4 blue	1432
	2 white	
	2 red	
	2 white	
	2 red	
	2 white	
	38	

37 complete patterns. 12 ends selvage on both sides.

CUT Nº 8

Take the pattern we have just worked out, and work it out for a warp of 1600 ends instead of 1400 besides the selvage, and you will find we get about the same results, but arrive at it in a little different manner:

14 blue
2 white
2 red
2 white
2 red
2 white
4 blue
2 white
2 red
2 white
2 red
2 white

38

Now in using a warp of 1600 ends, we of course divide the 1600 by 38 to find out how many complete patterns we have:

38) 1600 (42 complete patterns
152

80
76

4 ends over

Now the fellow who does not know exactly how these 4 extra ends should be worked in on a pattern, would say in this case—well, just add that on to the selvage—and of course would make no mark on his pattern indicating how it should commence or end up when laying in the warp; consequently the cloth would show up on both sides just about like Cut Number 7, except it would have 2 ends more of white and 2 more of red coming next to selvage on one side, and the last 2 of white would also be thrown into the selvage, and he would have 16 of white for selvage on one side and 22 on the other, which would not show up well in the finished piece of goods.

The right way to handle this pattern, however, would be as follows: Add the *4 ends over* onto the blue, and as you understand, these 4 ends of blue would come on the side of the warp you finish up on when laying it in. So you would have the first 14 ends of blue as called for in the pattern on the side you commence on and the 4 ends

over on the other side. Now we will just say we will take 4 ends out of the first pattern where we commence and place them over on the other side with the other 4 ends and make our cloth show up with 10 of blue in first pattern next to selvage instead of 14, and 8 ends on the other side coming next to the selvage, and the pattern should be written as follows:

Start with 10	14 blue
End with 8	2 white
	2 red
	2 white
	2 red
	2 white
	4 black
	2 white
	2 red
	2 white
	2 red
	2 white
	38

42 complete patterns. 16 ends selvage on both sides.

Now we will work out the total ends as before, as follows:

```
  42
  14 blue  ends to pattern
 ----
 168
  42
 ----
 588
```

Here we have 588 ends of blue in the 42 patterns, and as we are to add the 4 ends we have over on the blue our total ends will be as follows:

42		42		42
12	white	8	red	4 black
84		336		168
42				
504				
Selvage 32	ends			
536				

Total Ends

592 blue
536 white, selvage included
336 red
168 black

1632

With this pattern arranged, as shown on page 27, the cloth would show up the same as in Cut Number 8, except there would be 10 ends of blue on first side instead of 8.

CHAPTER SIX

In this chapter we will take up a pattern having some *corded work,* which you will note brings about a slight change in the way we find the number of patterns contained in the warp. We will take the following pattern:

	16	blue	
	4	white	
	16	blue	
	2	white	
	2	black	
cord	4	white	one eye (one dent)
	2	black	
	2	white	
	4	red	
	2	white	
	2	black	
cord	4	white	one eye (one dent)
	2	black	
	2	white	
	64		
	4	less extra ends used to each pattern	
	60		

Now it must be understood that all the patterns we have been working out, up to this one, have been in the *plain construction* of 2 ends to each dent in the reed, and in working out any pattern that is *irregular* in the reed, such as cords, or extra doublings, it must be figured on the same basis as though there were 2 ends to each dent, in order to keep the same *width of warp in the reed;* therefore, in this case, as the 2 cords in each pattern use 4 ends to the dent, we have 4 extra ends to the pattern (2 extra ends at each cord), so we subtract the 4 extra ends from the total ends in the pattern, which leaves 60 (as above); and this is the figure we must use to divide the total number of ends in the warp by to find out the required number of patterns. Counting 1400 ends to the warp, we have the following:

```
60)1400(23 complete patterns
  120
  ---
   200
   180
   ---
    20 ends over
```

Now the way this pattern comes out leaves our selvage ir rather bad shape. So we will have to do some changing around to get both sides to look alike. You will understand, of course, that the 20 ends over are that many ends on towards the 24th pattern; that being the case, of course, we will start back at the top of the pattern to add on and we find our pattern first calls for 16 of blue, and next 4 of white, so we would add 16 ends on to the blue and 4 on to the white, which takes up the 20 ends we have over the 23 patterns. Now if we should add these ends on this pattern, as just suggested, our pattern should be written as follows, and the selvage would show up like Cut Number 9, page 32:

	16	blue	
End	4	white	
	16	blue	
	2	white	
	2	black	
cord	4	white one eye (one dent)	
	2	black	
	2	white	
	4	red	
	2	white	
	2	black	
cord	4	white one eye (one dent)	
	2	black	
	2	white	
	64		

Total Ends	
752	blue
280	white
184	black
92	red
184	white for cord
1492	
32	white for selvage.
1524	

23 complete patterns

16 ends selvage on first side
20 ends selvage on other side

NOTE—The last four ends of white where the pattern ends come next to selvage on last side, making 20 ends of white for selvage on that side.

We will first get out our memorandum of colors for each pattern, as follows:

```
32 ends of blue
12 ends of white
 8 ends of black
 4 ends of red
 8 ends of white for cord
---
64
```

Referring back to page 30, we find we have 23 complete patterns, so we find the number of ends required of each color as follows:

32 blue	12 white	8 black	4 red	8 white for cord
23	23	23	23	23
96	36	184	92	184
64	24			
736	276			

```
Total Ends
 736 blue
 276 white
 184 black
  92 red
 184 white for cord
  20 ends over to add (See Page 30)
----
1492
```

Here we find we have 1492 ends, when we are supposed to have only 1400; but you will note that we have 4 extra ends to the pattern in this warp (see page 29) on account of the corded work, and as we have 23 complete patterns we will multiply the 23 by 4 and we find we have 92 extra ends in the warp on account of the cords.

Now, if we deduct the 92 ends from the 1492, it leaves 1400, and as 1400 ends is the number of ends our pattern is based on, it proves that our example is correct.

On page 30 we show that there are 16 ends of the 20 to be added onto the 736 of blue and 4 onto the 276 of white besides the 32 ends for selvage, which makes our total number of ends as shown on page 30.

CUT Nº 9

CUT Nº 10

This pattern as arranged on page 30, which would show up on the selvages as in Cut Number 9, is *not* correct, but should be arranged as follows and would then show up as in Cut Number 10, which is *correct*:

Start with 8	16	blue	
End with 8	4	white	
	16	blue	
	2	white	
	2	black	
cord	4	white	one eye (one dent)
	2	black	
	2	white	
	4	red	
	2	white	
	2	black	
cord	4	white	one eye (one dent)
	2	black	
	2	white	
	64		

Now you will notice that in having the pattern arranged as above we lay only 8 ends of blue for the first stripe instead of 16, as called for on page 30, and the 8 ends we have left out here to start with we carry on over to the other side, and when we finish up we find we have 8 ends of blue towards the second 16 of blue called for, which makes our pattern end up as marked above, and the cloth would show up as in Cut Number 10, which, I am sure, you will agree is an improvement over the selvages in Cut Number 9. In this case, however, the number of ends of each color would be the same as shown on page 30.

CHAPTER SEVEN

In this chapter we will have still another example in corded work, which, together with the one we have just explained, should enable anyone to handle anything along this line, as the general principles in working out all such patterns are included in these two. As you will understand, the number of *heddles* required to weave a piece of goods has nothing to do with the number of *ends* required in the warp. The number of heddles required for producing a piece of goods depends entirely on the kind of weave called for, etc. This part of the work, however, would of course come under the head of designing, while the object of this book is to teach you how to figure out the patterns whether you understand anything about designing or not.

	12	black	
x—	4	red	one end each eye
x—	4	red	one end each eye
	12	black	
	2	white	
	4	blue	
x—	2	white	one eye
	4	blue	
	2	white	
	4	blue	
x—	3	white	one eye
	4	blue	
	2	white	
	4	blue	
x—	4	white	one eye
End with 3	4	blue	
	2	white	
	4	blue	
x—	3	white	one eye
	4	blue	
	2	white	
	4	blue	
x—	2	white	one eye
	4	blue	
	2	white	
	98		
	8	extra ends in each pattern	
	90		

NOTE—All places marked "x" mean, reeded in one dent.

In working out this pattern, as shown on page 34, we will suppose our warp is to have 1600 ends in addition to the 32 ends for selvage.

We find the total number of ends in this pattern is 98. We also find that we have 8 extra ends used in the pattern on account of doublings in the reed, and as we are to work out the pattern on a basis of only 2 ends to each dent in the reed, in order to maintain a given width in the reed, regardless of the doublings in the reed, we simply subtract the 8 extra ends from the 98 in the pattern and use the 90 to work out our pattern by, as follows:

```
90)1600(17  complete patterns in the warp
   90
  ---
  700
  630
  ---
   70 ends over
```

Here we find we have 17 complete patterns and 70 ends on towards the 18th pattern, so we begin at the top of our pattern now and count the ends on down until we count 70, and we will find where the 18th pattern would end. Well, now we find it ends with 3 ends of blue at the point indicated (page 34). Now if we should let this pattern go at that, the selvages of the cloth when woven would show up like Cut Number 11.

CUT Nº 11

CUT Nº 12

In this pattern you will note from Cut Number 11 that the selvages show up quite different, while in Cut Number 12 both selvages are exactly alike; therefore, we will mark off the pattern showing the starting and stopping points as shown in Cut Number 12, which is correct, and should be written as follows:

	12	black	
x—	4	red	one end each eye
x—	4	red	one end each eye
	12	black	
	2	white	
Start here	4	blue	
x—	2	white	one eye
	4	blue	
	2	white	
	4	blue	
x—	3	white	one eye
	4	blue	
	2	white	
	4	blue	
x—	4	white	one eye
	4	blue	
	2	white	
	4	blue	
x—	3	white	one eye
	4	blue	
	2	white	
	4	blue	
x—	2	white	one eye
End here	4	blue	
	2	white	
	98		

Now in writing this pattern off for the slasher man or the beamer hand, as the case might be, as shown above, instead of commencing to lay in the warp at 12 black—the first of the pattern—he would commence on the *first* 4 of blue as indicated, and when he finished up his last pattern would end on the *last* 4 of blue as indicated.

Please bear in mind that when we go to write off a pattern we cannot tell how it will end up until we have worked it out up to the point where we have carried this

one, and that is the reason we sometimes have to mark our *starting point* down below the beginning of the pattern. However, when we once find out how the pattern will end up, and we get it laid off to best advantage, as we have now done in this case, we can *re-write* the pattern, as shown below, which will be exactly the same thing and possibly will be a more desirable arrangement for the slasher or beamer hand:

	4	blue
x—	2	white one eye
	4	blue
	2	white
	4	blue
x—	3	white one eye
	4	blue
	2	white
	4	blue
x—	4	white one eye
	4	blue
	2	white
	4	blue
x—	3	white one eye
	4	blue
	2	white
	4	blue
x—	2	white one eye
End here	4	blue
	2	white
	12	black
x—	4	red one end one eye
x—	4	red one end one eye
	12	black
	2	white
	98	
	8	extra ends in each pattern for cord, etc.
	90	

In this case the beamer or slasher man, when he would start to lay in the warp, would commence on the 4 of blue at first of pattern and his last pattern would end up as indicated.

Now we proceed to work out this pattern as follows: Referring to pattern as written on page 38—

```
90)1600(17 complete patterns
   90
  ---
   700
   630
  ---
    70 ends over
```

By referring to the pattern on page 38 we find, by counting down from first of pattern to point indicated where the last or 18th pattern should end, that we have only 62 ends called for, while we have 70 ends over that we are supposed to take care of. But you will note, as we have the pattern arranged, both sides are exactly alike; so in this case we will just add the other 8 ends onto the selvage, making the pattern read 20 white on each side, and the total number of ends would be as follows. First we will see how many ends of each color is called for to a pattern; starting at the top of pattern and picking out the blue first, we find:

```
40 ends of blue
14 ends of white (cord work)
12 ends of white  (plain)
24 ends of black
 8 ends of red
---
98
```

We find this adds up 98, which agrees with the total ends in pattern and proves it is correct. Now by referring to the above we find we have 17 complete patterns in our warp; so we find the total number of ends of each color, just as we have done in all the preceding patterns, as follows:

40 blue	14 white (cord)	12 white (plain)	24 black	8 red
17	17	17	17	17
280	98	84	168	136
40	14	12	24	
680	238	204	408	

Now we total it all up as follows:

680 blue
238 white (for cord)
204 white (plain)
408 black
136 red
70 the ends we have over (see Page 39)

1736

Now we find our total number of ends amounts to 1736, when our pattern is figured out on page 39 on a basis of the warp having only 1600 ends.

1736
1600

136 extra ends required on account of cord, etc.

By subtracting the 1600 from 1736 we find it leaves a difference of 136. This 136 ends are extra ends required in this warp on account of the corded work—that is, the extra doublings in the reed—and in order to prove our example and see if we have the right number of ends added on account of the corded work, we simply multiply the number of complete patterns we have in the warp by the number of extra ends we have to each pattern, and if it agrees with the extra ends called for, as shown above, it proves our example is correct, thus:

In this warp we have 17 complete patterns, and we have 8 extra ends to each pattern on account of corded work and extra doublings in the reed; so our example would be as follows:

17
8

136

Here we find 17 multiplied by 8 gives us 136, which proves our work to be correct.

Now in order to add the 70 ends we have over (on page 39) and get the right number of ends on each color,

we will begin at the top of the pattern (as shown on page 38) and count down to point indicated where the last pattern should end; taking the blue first, we have:

40 ends of blue
14 ends of white (cord work)
8 ends of white (plain)

62
8 the ends we propose to add on selvage

70

Here we have taken care of the 70 ends we have over, as shown in our example on page 39; so now, in order to get the *total* number of ends of each color, we add the ends as shown above to the amount called for on page 39, and we have:

40 ends added to	680 totals	720 ends of blue	
14 ends added to	238 totals	252 ends of white	(for cord)
8 ends added to	204 totals	212 ends of white	(plain)
—		408 ends of black	
62		136 ends of red	
		8	
8 ends added to selvage			
—			
70		1736	

Here we have a total of 1736 ends, which agrees with our total number of ends as shown on page 40—this being another check on our work showing it is correct (as the 32 ends for selvage are not included in the above). Now when this pattern goes to the beamer or slasher man it should be written out as follows:

	4	blue		
x—	2	white one eye		
	4	blue		
	2	white		
	4	blue		
x—	3	white one eye		
	4	blue		
	2	white		
	4	blue		
x—	4	white one eye		TOTAL ENDS
	4	blue	720	blue
	2	white	252	white (corded work)
	4	blue	252	white (plain) selvage incld.
x—	3	white one eye	408	black
	4	blue	136	red
	2	white	1768	
	4	blue		
x—	2	white one eye		
End here	4	blue		
	2	white		
	12	black		
x—	4	red one end one eye		
x—	4	red one end one eye		
	12	black		
	2	white		
	98			

17 complete patterns. Selvage 20 ends on each side.

CHAPTER EIGHT

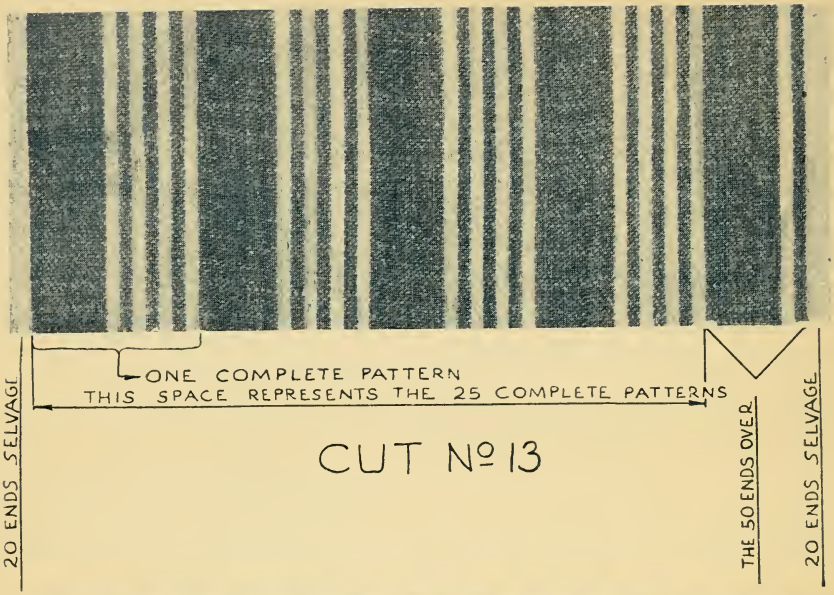
All that has been written so far in this book regarding the importance of having both selvages of the cloth look as near alike as possible, has reference to all kinds of fancy and staple gingham, dress goods, plaids, domets, etc.; but when it comes to bed-ticking, counterpanes, carpets, etc., it is equally as important that we have both selvages so arranged that when the goods are sewed together along the selvages, a complete pattern will be formed, and in order to illustrate this we will take the following pattern in ticking:

		36 blue
		6 white
		6 blue
End here with	2—	6 white
		6 blue
		6 white
		6 blue
		6 white
		78

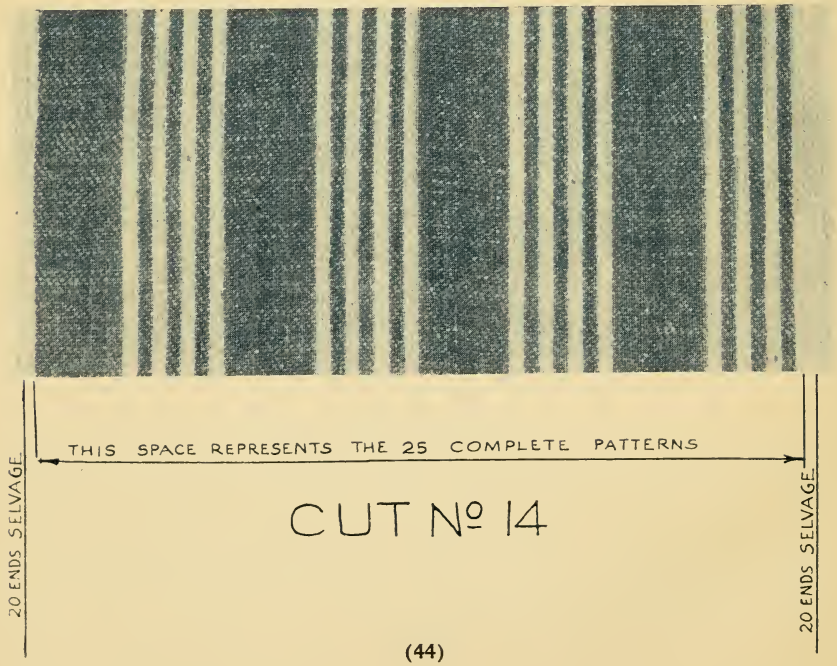
We will suppose this warp is to have 2000 ends, in addition to the selvage, and we will have 40 ends for selvage —20 on each side. So we will work out the pattern in the usual way, as follows:

```
78)2000(25 complete patterns
   156
   ---
    440
    390
    ---
     50 ends over
```

Now we find we will have 25 complete patterns in the entire width of the cloth and 50 ends towards the 26th pattern, which would cause the pattern to end up at point indicated, and the cloth would show up on the selvage as shown in Cut Number 13.



CUT Nº 13



CUT Nº 14

You will note if this pattern should finish up like Cut Number 13, when the two selvages are sewed together you would have a badly disfigured pattern at the seam, as you would have only one small stripe of blue and white separating two of the broad stripes of blue; therefore it will be necessary to make a slight change in the pattern in order to make the pattern work out nearer even. In this case this pattern should be written as follows:

	38 blue
	6 white
	6 blue
	6 white
	6 blue
	6 white
	6 blue
End here	6 white
	80

80) 2000 (25 complete patterns
160

400
400

nothing over

By writing the pattern, as above, we simply use 38 of blue in the pattern instead of 36, which is a very slight change and does not change the appearance of the pattern in the cloth enough to be noticed, and at the same time it gives us 80 ends to each pattern instead of 78, which makes our warp divide up into even patterns and our cloth would show up like Cut Number 14, which is correct for this kind of goods. However, both selvages of this pattern could be made to look exactly alike by taking half of the 38 of blue in first pattern and placing it on the other side, and when the cloth is sewed together the results would be the same and the pattern would be written as follows:

Start with 18	38 blue	Total Ends
End with 20	6 white	1400 blue
	6 blue	600 white
	6 white	2000
	6 blue	40 ends for selvage
	6 white	2040
	6 blue	
	6 white	
	80	

25 complete patterns, even. Selvage, 20 ends on both sides.

The above pattern would be worked out as follows:

56 ends of blue to one pattern
24 ends of white to one pattern

80

Referring to page 45 we find we have 25 complete patterns with no ends over; therefore, we have nothing to add on.

56 blue	24 white
25	25
280	120
112	48
1400	600

CHAPTER NINE

In working out a pattern that has corded work of a ply yarn, where you have only one thread of the ply yarn to a dent in the reed, when we are working on a basis of 2 ends to each dent, it should be worked as follows, taking the following pattern:

End here	14 black
one dent	1 cord (ply yarn)
	4 black
one dent	1 cord (ply yarn)
	20
	2
	22

Here we have 2 cords in the pattern using only one end to the dent. So in cases of this kind we *add* just as many ends to the total ends in the pattern as there are ends left out in the reed on account of the cord, which in this case is 2 ends to the pattern (this you will note works just the reverse when using cords composed of single yarn); therefore we *add* 2 to the 20 and use the figure 22 to divide by to find the correct number of patterns in the warp. Suppose we are working on a basis of 1400 ends to the warp, we would have the following example:

```
22) 1400 (63 complete patterns
    132
    ---
     80
     66
    ---
     14 ends over
```

Black	18	ends to the pattern	
	63	patterns	
	54		
	108		
	1134		
	14	the 14 ends over	
	1148	ends black required	

Cord	2	ends to the pattern	
	63		
	126	total ends	

Here we have added the 14 ends over on to the black, which would make the pattern read as follows, and the cloth would be exactly alike on both sides:

End here	14	black	
one dent	1	cord (ply yarn)	
	4	black	
one dent	1	cord (ply yarn)	
	20		
	2		
	22		

	Total	Ends	
	1148	black	
	126	cord (ply yarn)	
total	1274		
	126	equals 2 multiplied	
	1400	by 63	

63 complete patterns. Selvage 16 on both sides.

Here, you will note, our total number of ends *required* is only 1274, while we were working the pattern on a basis of 1400 ends; you will note also that by multiplying the 2 ends we added to each pattern by 63—the number of complete patterns—we get 126. This amount, added to the 1274, totals 1400, which proves our example correct.

CHAPTER TEN

BLANKET SHEETS

Quite often it becomes necessary to get out a lot of samples of pattern work, especially so with the mills that make more or less of gingham, dress goods, etc.; and it is most always customary to get them out in what is called "blanket sheets." While this is rather expensive and lots of trouble, yet it enables the mills to get out quite a variety of samples in a comparatively short time, without having much yarn and goods tied up in a lot of new styles before they know what styles will be most acceptable to the trade.

In making blanket sheets it is simply a matter of making 2 or more different styles of patterns, side by side in the reed, all beamed on the same beam, and is simply a piece of cloth made up of different patterns, the full width of the piece being equally divided, according to the number of different patterns being made.

If your pattern happens to be small and medium-sized checks, it is usually the practice to make *each pattern* about 7 inches wide in the reed; therefore you can easily make 4 such patterns at a time, giving each pattern a space of 7 inches in the reed, making your warp spread 28 inches in the reed. If you should happen to have very large checks or stripes, it would possibly be necessary to make each pattern about 9 1/3 inches wide in the reed. This being the case, you would be able to weave only 3 patterns at a time, in a reed space of 28 inches.

Before deciding on the width of your blanket sheets, however, it is well to *first* find out what *widths* can be handled *successfully* in the *finishing* process. Don't under any circumstances, make your blanket sheets any wider than can be handled satisfactorily in the finishing plant. I have seen good nice samples ruined simply by

making them wider than the regular run of cloth in the finishing machines, making it necessary to readjust the guides, etc., on every machine, and before the few yards of samples get through, more or less of it is damaged all on account of making the goods a little too wide, in order to save a little time in the weaving.

We will suppose for an illustration that we want to make the following 4 patterns into a blanket sheet form for samples, and we want each pattern to cover a space of 7 inches in the reed, making the total width in the reed 28 inches besides the selvage. We will suppose we are going to use a 27-dent reed—that is, 27 dents in the reed to the inch—and we will draw our warp in the reed 2 ends to each dent.

First we must find out how many *ends* our entire width of blanket will contain—that is, all *four* of the patterns. We have a 27-dent reed and we propose to spread our warp 28 inches, using 2 ends to each dent; therefore we have the following, using 27 dents to the inch and 2 ends to each dent:

```
 27
  2
 --
 54 ends per inch in reed
```

Here we have 54 ends to each inch of reed space we propose to use, and as we are to have a total width of 28 inches in the reed we have 54 times 28, as follows, for the total number of ends:

```
  54
  28
 ----
 432
108
----
1512 total ends required besides selvage
```

Now, as we are to have 4 different patterns in the width of this cloth, we divide the 1512—total ends required for total width—by 4, thus:

4)1512(378 total ends required for *each* pattern
12

31
28

32
32

In working out the total number of ends required for the blanket we must work out each different pattern separately, using the 378 ends required for each. We will take the following 4 patterns:

No. 1	No. 2	No. 3	No. 4
End 6 blue	End 4 10 blue	16 blue	8 blue
6 white	4 white	2 white	8 white
—	4 blue	4 blue	4 blue
12	4 white	2 white	8 white
	—	End 4 16 blue	8 blue
	22	2 white	4 white
		2 blue	4 blue
		2 white	4 white
		2 blue	4 blue
		2 white	8 white
		—	4 blue
		50	4 white
			4 blue
			End 2 4 white
			76
31 patterns	17 patterns	7 patterns	4 patterns
Total ends 378	Total ends 378	Total ends 378	Total ends 378

REED	7 inches	7 inches	7 inches	7 inches	REED
	<——>	<——>	<——>	<——>	
	31 patterns	17 patterns	7 patterns	4 patterns	

<——— The 28 inches reed space used ———>

Here we find, by dividing the 378 by 12—the total ends in pattern No. 1—we have:

No. 1

12)378(31 complete patterns
36

18
12

6 ends over

No. 2

22)378(17 complete patterns
22

158
154

4 ends over

No. 3	No. 4
50)378(7 complete patterns	76)378(4 complete patterns
350	304
28 ends over	74 ends over

Now we find the total number of ends of *each color* required for *each different pattern.*

Number 1—We find we call for 6 ends of blue and 6 ends of white to the pattern, so we refer to Number 1, on preceding page, and we find we have 31 complete patterns and 6 ends over. So we multiply the 31 by 6 to find the ends of blue required:

31	31
6	6
186 blue required	186 white required

The 6 ends we have over we add on to the blue, making the total ends required for Number 1 as follows:

192 blue
186 white
378

Number 2 calls for 14 ends of blue to the pattern and 8 ends of white, and as we have 17 complete patterns in Number 2 and 4 ends over we multiply the 17 by 14:

17	17
14	8
68	136 white required
17	
238 blue required	

The 4 ends we have over we add on the blue, making total ends for Number 2 as follows:

242 blue
136 white
378

Number 3 calls for 40 ends of blue and 10 ends of white for each pattern, and as we have 7 complete patterns in Number 3 we multiply the 40 by 7:

40	10
7	7
280 blue required	70 white required

In this pattern we have 28 ends over, so we count down from the top of the pattern until we count 28 and we find it ends on the second 16 of blue with only 4 ends, so we start at point indicated commencing with the 4 and count back to the top, and we find we require 24 ends for the blue and 4 for the white, which takes care of the 28 ends we have to add on. So we add 24 on to the blue and 4 on to the white, making total ends of each color for this pattern as follows:

280	70
24	4
304 blue	74 white

Total ends required
304 blue
74 white
378

Number 4—We find we require 36 of blue and 40 of white to each pattern, and as we have only 4 complete patterns in Number 4, we multiply the 36 by 4 to find the blue required, and 40 by 4 to find the white required.

36	40
4	4
144 blue	160 white

In this pattern we have 74 ends over, and by counting down from the top to the point indicated we find our last pattern ends with 2 ends at the last 4 of white. So by counting down from top of pattern to point indicated, we find we require 36 of blue and 38 of white, which we

add on to each color, making the total ends required for each color in this pattern as follows:

144	160
36	38
180 blue required	198 white required

180 blue
198 white
378

Now we add all the blue called for in each of the four patterns and all the white, and we find the total ends of each color required for the blanket as follows:

No. 1—Blue	192	white	186
No. 2—Blue	242	white	136
No. 3—Blue	304	white	74
No. 4—Blue	180	white	198
Total blue.....	918	white	594

Here we find we have total ends required—

918 blue
594 white
1512

Our total ends required, you see, agrees with the total ends we started out to work the blanket from on page 50, which proves our examples all correct.

This covers the principles involved in working out any blanket sheets, and this, together with the other information contained in this book, should enable anyone to work out any kind of pattern proposition that is liable to come up.

CHAPTER ELEVEN

NOTE—We have used the decimal method of expressing all fractions in these examples, for the reason that they are so much more easily understood and easier to handle in calculations. For example: .1 equals 1/10 (one tenth); .6 equals 6/10 (six tenths); .07 equals 7/100 (seven hundredths); .24 equals 24/100 (twenty-four hundredths) .073 equals 73/1000 (seventy-three thousandths); .814 equals 814-1000 (eight hundred and fourteen thousandths), etc. In other words, where there is only one figure to the right of the decimal point, it expresses tenths; two figures to the right of the decimal point expresses hundredths; three figures to the right of the decimal point expresses thousandths, etc.

While the principal object of this book is to teach those desirous of learning, how to figure out all kinds of pattern work—what is generally termed "figuring out patterns" for gingham, fancy dress goods, plaids, ticking, etc.,—it will be interesting to some, no doubt, to know how to find the width of a piece of goods, number of ends required to weave it, and about what the goods wil' weigh—that is, the number of yards per pound. So I will give a few simple rules which will enable anyone with a very slight knowledge of mathematics to understand.

In the first place it is well to bear in mind that there is no rule that will always work out exact in cases of this kind, as it is next to impossible to hit just right on a few things that have to be estimated in figuring the *width* and *weight* of the cloth—such as the exact take-up, the exact percentage of size on the warp, etc.—and in making such calculations it is necessary to use reasonable judgment in allowing for the take-up in weaving in *width* and *length;* also in the amount of size on the warp, keeping in mind the fact that *there is no sizing on the filling.*

TO FIND THE PERCENTAGE OF SIZING ON A WARP

Take one average warp, weigh it before it is sized and then weigh the *same warp* after it is sized and you will get a fair average. Thus, if the warp weighs 100 pounds before it is sized and the same warp weighs 107 pounds afterwards, you have:

107 weight after being sized
100 weight before being sized

7

Weight of warp before being sized ——— > 100)700(7 per cent size on warp
700

TO FIND HOW MUCH THE CLOTH WILL TAKE UP IN WIDTH

If convenient go to a loom weaving on a similar piece of goods and see how wide it is *in the reed* and then measure it down on the *cloth roller*. First see that the warp has about the right tension, as you can very easily vary the width of the cloth one-half inch or more by tightening or loosening up on the beam weights.

On ordinary gingham, etc., with about 28-inch reed space, the goods will come off the loom about 26½ to 27 inches wide. If the goods should be of a rather open construction it will pull down to as low as 26 inches, while if it is closely woven it will average about 27 inches. On wider goods, the difference, of course, will be in proportion to the width.

TO FIND THE TAKE-UP IN LENGTH

This will vary according to the picks per inch being put in, also according to the number of yarn of the filling used and the number of warp yarn and the nature of the weave—that is, whether it is a plain weave or a three or four harness twill, etc.—so it is a good idea to get a similar piece of cloth just like it comes off the loom (that is, before it is finished), cut off 10 inches in length, *warp way*, pull out a few warp ends, straighten them out good and see how much longer the warp threads are than the

piece of cloth; if the cloth is 10 inches long and the warp ends measure out 10½ inches long, you have a 5 per cent. take-up, thus:

```
                10.5 warp ends
Subtractor      10.0 cloth
                ----
                 .5
                 100
                ----
Divisor         100)500(5 per cent take-up
                   500
                   ---
```

In order to simplify this rule, we simply use the decimal point thus, 10.5, which is the same as 10½.

RULE: In finding the percentage of take-up by this rule subtract the length in *inches of the cloth* from the length of the *warp ends in inches,* multiply this difference by 100 and then divide by length of cloth in inches, using same *number of figures* for divisor as *are used* in subtracting.

TO FIND NUMBER OF ENDS REQUIRED FOR GIVEN WIDTH

Suppose you wanted to weave a piece of goods 28 inches wide in the reed and you were going to use a 29-dent reed (that is, 29 dents to the inch) and you wanted to have 2 ends to each dent; find the number of ends required:

```
 29 dent reed
  2 ends in each dent
 --
 58 ends in one inch
 28 inches wide in reed
 ---
 464
116
----
1624 ends required besides the selvage
```

(This cloth would come off the loom about one inch or one and a half inches less in width, according to the yarn used, picks put in, weight on loom beam, etc.)

CHAPTER TWELVE

HOW TO FIGURE THE WEIGHT OF GOODS BEFORE BEING WOVEN

On pages 56 and 57 we have explained how to find the percentage of sizing and take-up. Now when you go to work in the sizing and take-up, work it in as follows: First, supposing you have 5 per cent. sizing on your warp and the take-up amounts to 10 per cent.; *add* them both together, making it 15 per cent. size and take-up. But instead of multiplying by 15 make it 1.15, placing the decimal point before the 15 as shown.

Take the pattern as we have worked out in Chapter One, we have a total of 1432 ends:

```
 1432  Total ends in warp
 1.15  Size and take-up
 ----
 1160
1432
1432
-------
1646.80  This is the dividend for warp only.
```

NOTE—Bring down your decimal point.

Now for a *divisor for the warp only,* multiply 840 by the number of warp yarn you propose to use. We will suppose we are going to use for this warp No. 26's:

```
  840
  26  number of warp yarn
 ----
 5040
1680
-----
21840  Divisor for warp only
```

DIVIDEND

DIVISOR →

```
21840) 1646.80 (.075  weight of warp in one yard of
       1528.80         cloth
       -------
        118.000
        109.200
        -------
```

Now we have gotten out the weight of the warp for *one yard* of cloth, so we next get out the weight of filling for *one yard.* To determine this, however, we must know what number of filling we propose to use, the number of picks to the inch, and the width of warp in the *reed.*

REED: We will use a 26-dent reed, 2 threads to each dent, which will give us 52 threads to the inch in the reed.

PICKS: We will have 54 picks to the inch in this goods and we will use No. 24's yarn for filling.

In order to be *exact,* regarding the width in the reed, we *should deduct* just half of the number of warp ends we propose to use for selvage (as the selvage is drawn 4 ends to the dent) from total ends in warp, when figuring for the width in the reed, but as that little difference amounts to practically nothing in figuring the weight, we will take the *total* number of ends to figure from.

Now we divide the 1432 by 52, which is the number of warp ends to each inch of reed space; this, of course, will give us the width in inches in the reed. Thus:

```
52)1432(27.54  inches wide in the reed
   104
  ----
   392
   364
  ----
    280
    260
  ----
     200
     208
  ----
```

Now, as we are to have 54 picks of filling to the inch, in order to find the length of filling used to one inch of cloth we multiply the 27.54 by 54, thus:

27.54 width in reed
54 picks per inch

110 16
1377 0

Divid'd for filling (yards) 1487.16 inches of filling used in one inch of cloth

or

Yards of filling used in one yard of cloth

Now the 1487.16 yards above is our dividend for the filling, and to get the divisor for the filling we multiply the number of filling we propose to use by 840, thus:

840
24 No. of filling yarn

3360
1680

20160 Divisor

DIVIDEND
DIVISOR

20160) 1487.16 (.073 of a pound weight of filling to one yard of cloth
1411 20

75 960
60 480

15 480

Now to find the yards per pound of this goods, we add together the 73/1000 of a pound (weight of filling to one yard of cloth) to the 75/1000 of a pound (weight of warp to one yard of cloth) and divide 1000 by that product, thus:

73 filling
75 warp

148) 1000 (6.77 yards per pound. Weight of goods
888

1120
1016

1040
1016

NOTE—In working out the weight of a piece of goods you should not fail to carry your decimal point on through as outlined. It requires several small calculations to figure out what a piece of goods will weigh, yet you will note that this, like all the other examples in this book, is worked down to the plain and simple rules of *addition, subtraction, multiplication and division,* and if you can do that, you will have no trouble to master everything in this book.

CORDED GOODS

Take the pattern as shown and explained in Chapter Six, which has 184 ends for cord work. The cord in this pattern should be run on a separate beam from the rest of the warp, as it will not take-up in weaving like the other part of the warp. In fact, this cord will lay practically straight in the cloth. Therefore, there will be no take-up to allow for these 184 ends. We will figure the weight of this piece of goods, taking the same construction, number of warp and filling, etc., as we used in the preceding example, which would make the goods weigh the same as the piece of goods illustrated in Chapter One, as shown in example on page 60, but for the additional ends required on account of the doubling for cord work which will cause this piece of goods to run a little heavier, as you will note by the following examples:

Total ends in warp 1524
Deducting ends for cord 184

1340
1.15 per cent. size and take-up

6700
1340
1340

1541.00 *part* of dividend

184 ends cord
1.05 per cent of sizing *only*

920
184

193.20 other part of dividend

Now for a complete dividend, we add both parts of the dividend together, thus:

```
1541.00
 193.20
-------
1734.20 Dividend
```

For a divisor for the warp we multiply 840 by the number of warp yarn, thus:

```
   840
    26 No. of warp
  ----
  5040
 1680
 ----
 21840 Divisor
```

DIVIDEND
DIVISOR

```
21840) 1734.20 (.079 of a pound. Weight of one
       1528 80          yard of warp
       -------
        205 400
        196 560
        -------
          8 840
```

Now, as we are to have the same spread in the reed, picks, and number of filling in this piece of goods as we had in the piece as illustrated in Chapter One and as figured out on pages 59 and 60, the weight of *filling* in one yard of this cloth would of course be the same; therefore the weight of this piece of goods would be as follows:

```
 79 warp
 73 filling
 ---
152) 1000 (6.57 yards per pound. Weight of goods.
      912
      ---
       880
       760
       ---
       1200
       1054
       ----
```

You will notice that on account of the extra ends used in the corded work in this piece of goods, it will run practically 20 points heavier than the same goods without the corded work; which means that out of every 200 yards

of the goods with the cord you would use about one pound more cotton than you would in the same goods without the cord work. Counting cotton at 10 cents per pound, this would mean about 5/100 (five one hundredths) of a cent extra cost per yard.

TO FIGURE THE WEIGHT OF GOODS AFTER THEY ARE WOVEN.

Use *yards* for dividend, and *pounds* for a divisor, thus:

YARDS

POUNDS → 1024)7103(6.93 yards per pound
6144

9590
9216

3740
3072

Suppose you have one piece of goods 45¼ yards long that weighs 6 pounds and 12 ounces. Multiply the yards, 45¼, by 16 for a dividend, thus:

45.25 equals 45 1/4
16

271 50
452 5

724.00 dividend

Now multiply the 6 pounds by 16 and then add to this product the other 12 ounces for a divisor, thus:

16 ~~pounds~~
6 lbs.

96
12 ounces

108 divisor

DIVIDEND

DIVISOR → 108)724.00(6.70 yards per pound
648

760
756

40

CHAPTER THIRTEEN

TO FIGURE THE WEIGHT, ETC., OF WARPS

TO FIND THE WEIGHT OF A WARP

For a dividend multiply the number of ends by the number of yards:

```
 1700   yards
   1600 ends
-------
1020000
1700
-------
2720000 Dividend
```

For a divisor, multiply the number of yarn by 840:

```
  840
   26 No. of yarn
-----
5040
1680
-----
21840 Divisor
```

```
21840)2720000(124.54  pounds.  Weight of warp
      21840
      -----
       53600
       43680
       -----
        99200
        87360
        -----
        118400
        109200
        ------
         92000
         87360
```

TO FIND THE LENGTH OF A WARP

Multiply the weight of the warp by the number of yarn and then multiply that product by 840 for a dividend, thus:

124.54 weight of warp
26 No. of yarn

747 24
2490 8

3238 04
840

12952 160
259043 2

2719953.60 Dividend

For a divisor use the number of ends to the warp as follows:

Ends in warp 1600) 2719953.60 (1699.97 yards long, length of warp
1600

11199
9600

15995
14400

15953
14400

15536
14400

11360
11200

TO FIND THE NUMBER OF YARN OF A WARP

Multiply the net weight of the warp by 840 for a divisor, thus:

124.52 weight of warp
840

498 080
9961 6

10459 6.~~80~~ Divisor (here we cancel the decimal)

For a dividend multiply the length of the warp in yards by the total number of ends it contains, thus:

1700 yards long
1600 ends in warp

1020000
1700

2720000 Dividend

104596) 2720000 (26 s number of yarn
209192

628080
627576

CHAPTER FOURTEEN

In order to be able to figure the production of a room or section without going through a long string of calculations each time to do so, it is a good idea to have your *loom* and *cloth constant* to figure from, thus making the work short and simple.

To find your loom constants for 10 hours per day or 60 hours per week, *any speed,* multiply speed of loom by 6.

Example:

Loom speed 160
6
960 Constant

Another example:

Loom speed 170
6
1020 Constant

TO FIND CONSTANT FOR CLOTH—ANY LENGTH CUTS

Multiply picks per inch by 36.

Example:

50 picks per inch
36
300
150
1800 constant for 50 pick goods

Another example:

56 pick goods
36
336
168
2016 constant for 56 pick goods

First, multiply all the looms run for the week of any one speed by the constant for that speed.

For all the looms you wish to figure on, of different speeds, figure them out as above suggested and add the product of each example together for a divisor, thus: We will suppose we have a section of 60 looms, 30 of which have a speed of 160 pick and the other 30 a speed of 170 pick; we will also suppose now that these 60 looms have run all the week (6 days), so we have—

30 looms, speed 160—run 6 days
6

equals 180 looms run one day at 160 pick

30 looms, speed 170—run 6 days
6

equals 180 looms run one day at 170 pick

180 looms run at 160
960 constant

10800
1620

172800 part of divisor in this case

180 looms run at 170
1020 constant

3600
180

183600 other part of divisor in this case

183600
172800

356400 Divisor

For a dividend multiply total yards of each kind of goods woven by the constant for that kind of goods; if more than one kind of goods is woven, add the product of each together; this will give you the dividend, thus: We will suppose we wove on this section for the week the following:

7200 yards of 50 pick goods
9000 yards of 56 pick goods

NOTE—It makes no difference which looms the goods are woven on, just so it comes off the looms included in our calculations.

```
  7200   yards of 50 pick goods
  1800 constant for 50 pick goods
-------
5760000
7200
-------
12960000 Part of dividend

    9000 yards 56 pick goods
    2016 constant, for 56 pick goods
   ------
   54000
   9000
  18000
  -------
  18144000 the other part of dividend

          18144000
          12960000
          --------
          31104000 Dividend
```

Now divide the dividend by the divisor, which will give a percentage of possible production, thus:

```
356400)31104000(87 per cent. production
       2851200
       -------
        2592000
        2494800
        -------
```

While it has taken right much figuring to make this rule clear to the inexperienced, yet, if you will study it closely you will find after all it is quite simple. The idea, of course, is to get out the constants for the different speeds of looms you happen to be running, also for the different kinds of goods you are running on; and it is only a few minutes work to figure the entire production for a large room, running on quite a mix-up of different speeds and different pick goods. Each section, of course,

is supposed to be worked out on the same basis; if you wish to figure them separately, take the average length of cuts to get at the yards woven on each section of the different kinds of goods.

The entire calculation can be shortened considerably by cutting off the ciphers in the constants; but in taking advantage of this method be sure you cut off the *same number of ciphers* or *figures* in the *loom constants* as you do in the *cloth constants.*

A short way, however, to figure the production for a large room, when there are more or less looms of different speeds, first get the average speed.

RULE—Multiply all the looms run of one speed by the speed (picks per minute) and add these products together for a dividend. Then add all the looms run together and take this product for a divisor, thus:

180 multiplied by 160 equals 28800
180 multiplied by 170 equals 30600

Divisor 360 Dividend 59400

360)59400(165 average speed
360
2340
2160
1800
1800

NOTE—Take any number of looms you may happen to have of different speeds and you will get the *average* speed by following the above rule.

165 average speed of loom
6
990 constant for speed of 165 pick
360 looms run
59400
2970
356400 Divisor

NOTE—By this method you will see we get the same divisor as we have on page 68, which of course will give same results as shown on page 69.

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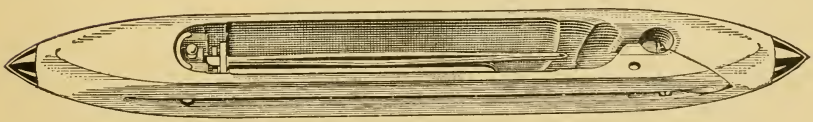

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